7-10-19 MG
EPA/LCCS/~~STOVE~~

Surface Water Sampling Plan
Lake Calumet Cluster Site
OU2 RI/FS

July 2019

OU2 RI/FS Statement of Work

- The RI Report shall evaluate the nature and extent of hazardous substances, pollutants, or contaminants present in groundwater at and emanating from the Site.
- The RI Report shall also assess the risk that these hazardous substances, pollutants, or contaminants in groundwater present for human health and the environment.

Backdrop

- LCCS is situated among other industrial and municipal solid waste landfills and areas filled with slag, dredged materials, and other fill.
- Indian Ridge Marsh, the key receptor for the OU2 human health and ecological risk assessments, was used for the disposal of slag from steelmaking operations and dredged materials from the Calumet Harbor and River during the 1970s.

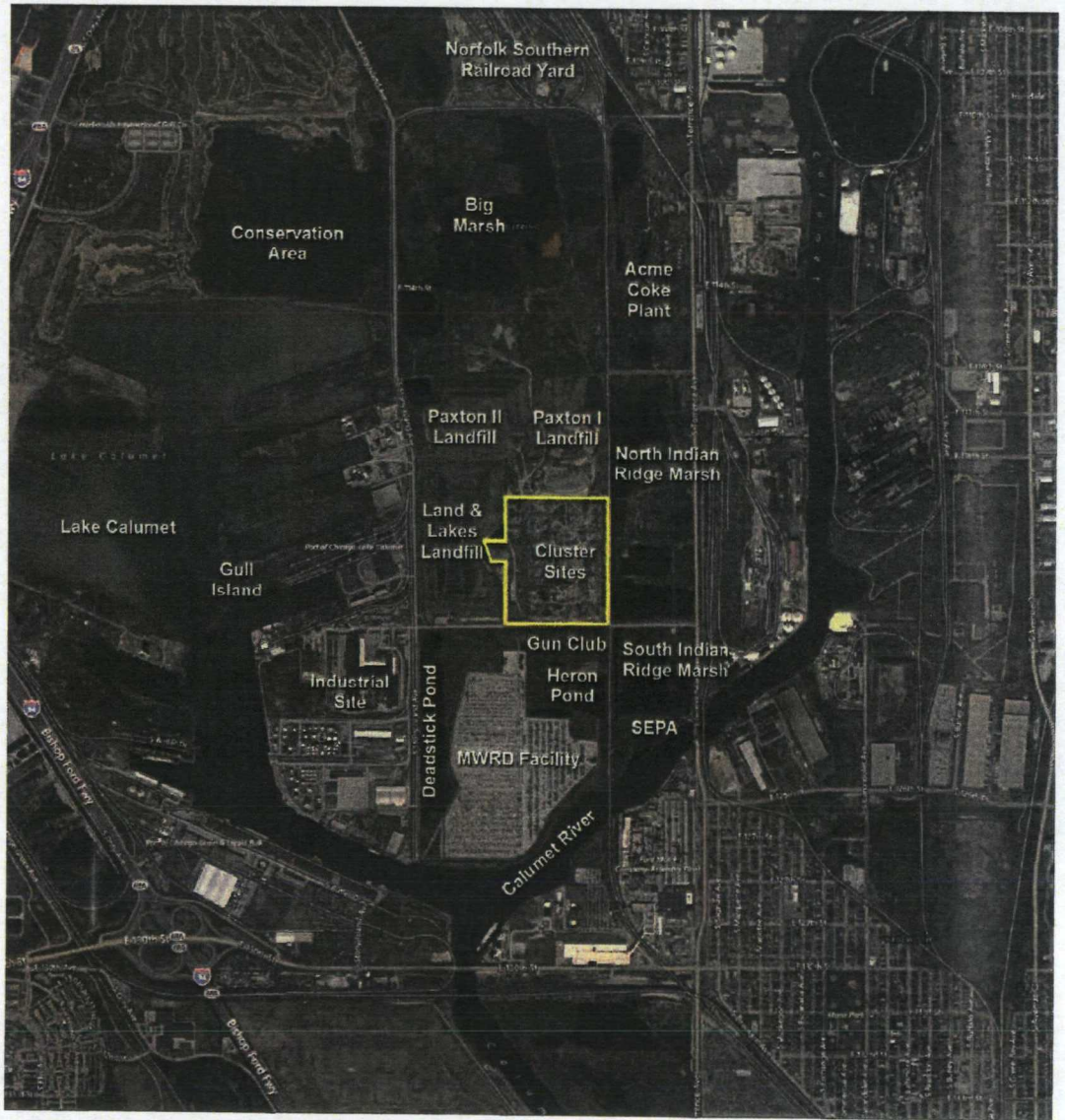


Figure 2. Surface Water Sampling Plan (Arcadis 2018)

Figure 4. Technical Memorandum (Arcadis 2017)

Basis for Surface Water Sampling

- There have been multiple past surface water sampling events (by others) that overall show very good water quality in Indian Ridge Marsh. Data are not available for all COCs and data that are available are not current.
- LCCS groundwater assessment (Arcadis, July 2017) showed some COCs at concentrations requiring further evaluation for both human health and ecological risk.
- Groundwater assessment used simple ratio (10X) to account for mixing and dilution of vented groundwater into Indian Ridge Marsh surface water.

Purpose of Surface Water Sampling

- Purpose of current study is to collect and assemble a robust data set to assess the impacts of groundwater emanating from LCCS on surface water quality in Indian Ridge Marsh.
- Assessment will provide overall data set comparisons and examination of spatial variability (and inferred sources) throughout Indian Ridge Marsh.

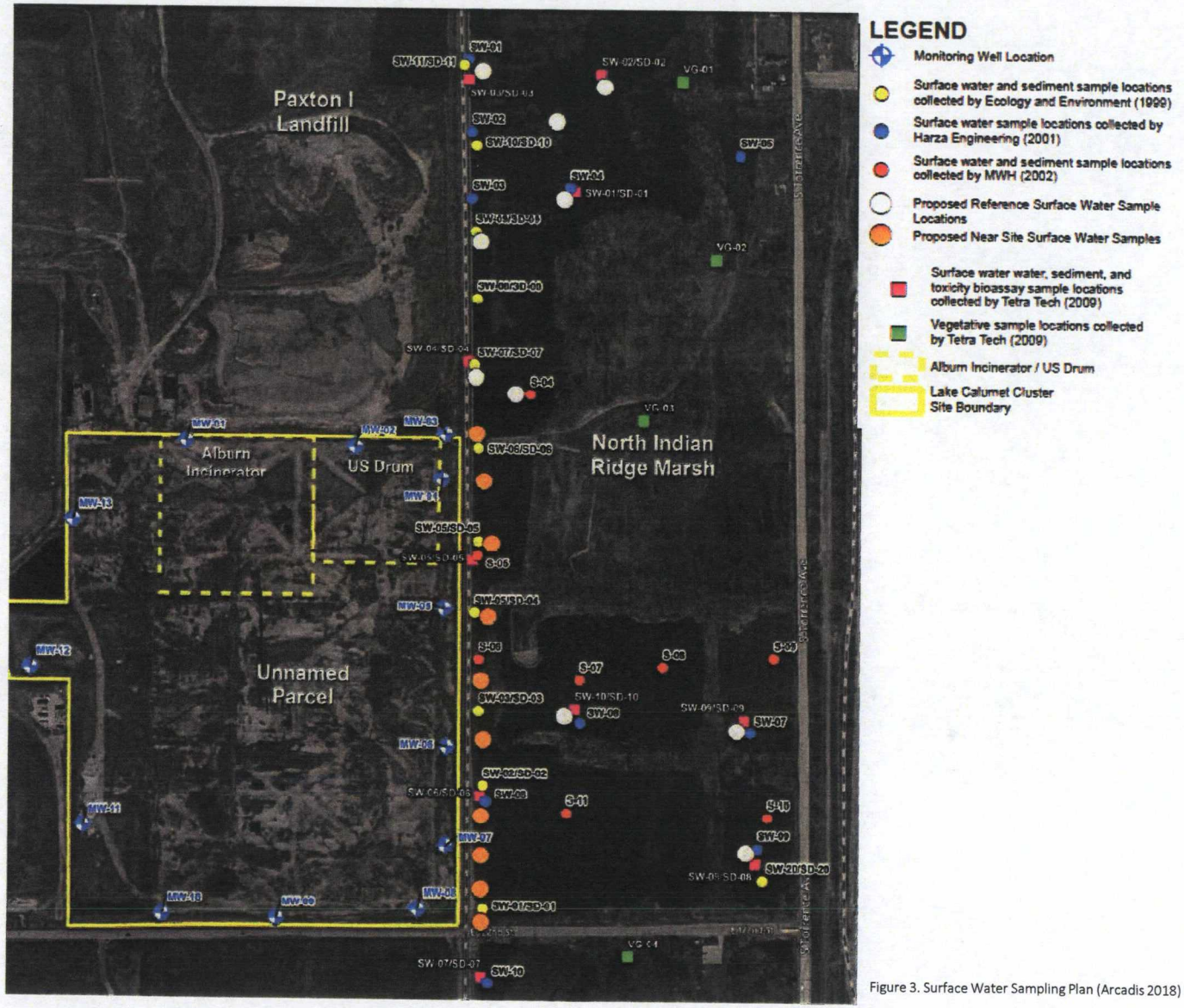


Figure 3. Surface Water Sampling Plan (Arcadis 2018)

Tenets of Study

1. LCCS shallow groundwater primarily discharges to North Indian Ridge Marsh.
2. North Indian Ridge Marsh is the nearest and most vulnerable surface water body.
3. Potential human health risks are associated with surface water contact (*e.g.*, recreator).
4. Potential groundwater contact and ground water use/consumption are not completed exposure pathways.

Tenets of Study (cont'd)

4. Potential ecological receptors are surface water biota.
5. Evaluation of potential impacts from venting LCCS groundwater can be determined based on characterization of surface water quality in Indian Ridge Marsh.
6. Potential risks relate to surface water quality in the Marsh.

Technical Issues from EPA April 8, 2019 Comments

- LCCS groundwater discharge to Indian Ridge Marsh.
- Temporal variability in hydrology.
- Preferential flow paths for venting groundwater.

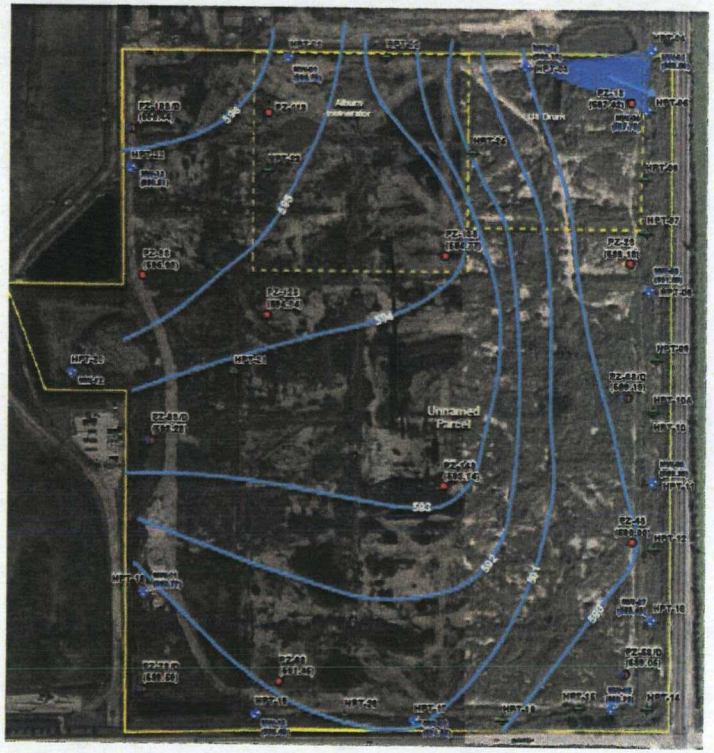
Groundwater Discharge to Indian Ridge Marsh

- Groundwater flow at LCCS. Data for four quarters shows predominant flow to east with component to south.
- LCCS groundwater elevations typically range from 590 to 596 ft-amsl. (Ground surface elevations typically range from 595 to 600 ft-amsl.)
- IRM bathymetric elevations (from Roadcap, et al., 1999)
  - Range from <579 to 585 ft-amsl
  - 75% from 580 to 582 ft-amsl
- Surface water elevation nominally 583 ft-amsl.

LCCS Groundwater Elevations

March 2016

August 2016



LCCS Groundwater Elevations

September 2016

December 2016

IDEALIZED CROSS SECTION

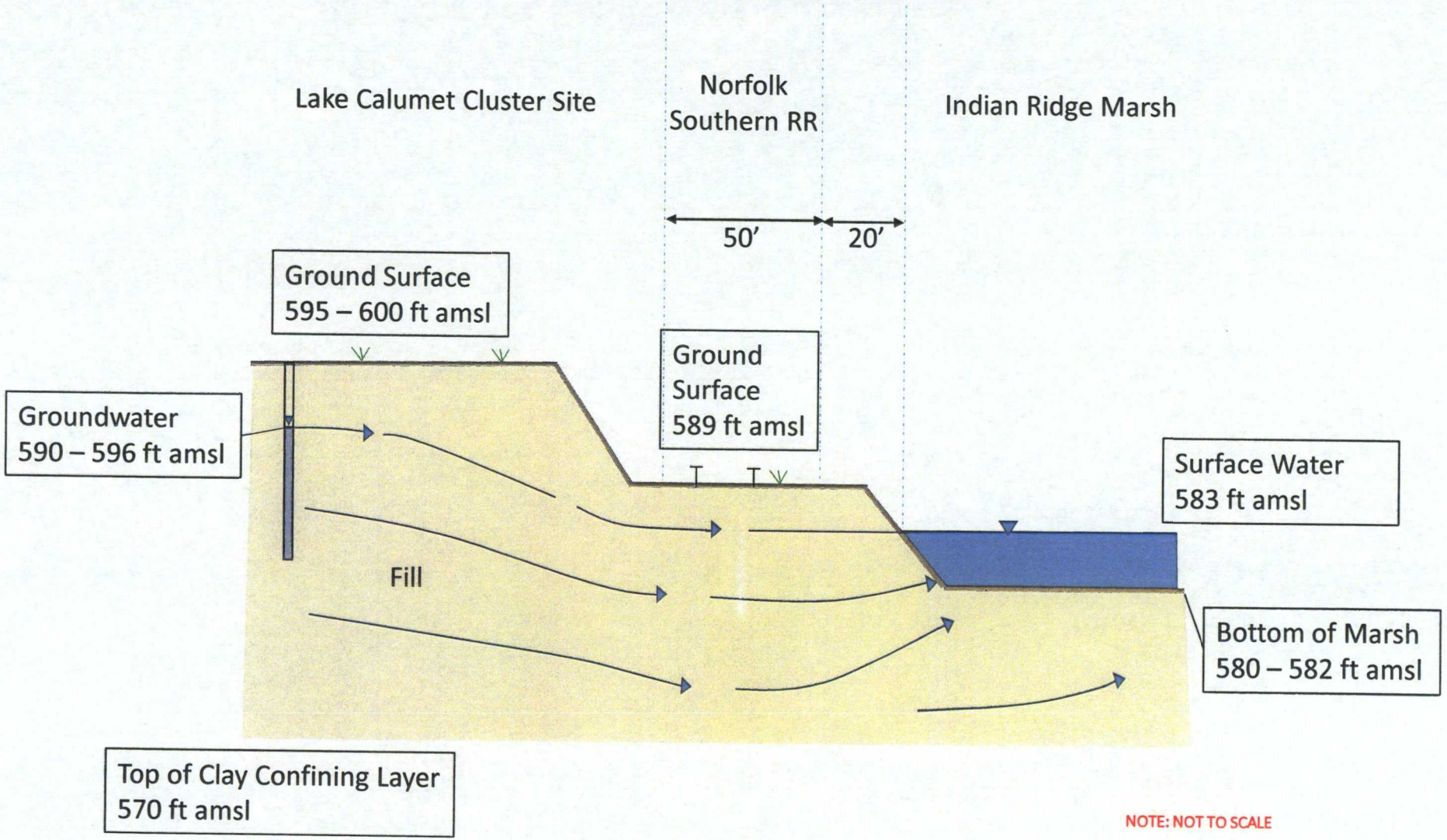


Figure 4. Technical Memorandum (Arcadis 2017)

Temporal Variability of Hydrology

Additional scope to address issue:

- Install staff gauge in Indian Ridge Marsh and transducers in wells along east side of LCCS. Record water level data over a period of several months to assess variability.
- Conduct two sampling rounds under differing conditions, but still within the range of low to normal conditions. Assess need for additional data after reviewing results from the initial two sampling rounds.

Preferential Flow Paths for Venting Groundwater

- Surface water sampling locations selected to correlate with potential zones of high COCs mass flux in LCCS groundwater.
  - ➢Highly transmissive zones identified in HPT testing.
  - ➢Higher hydraulic conductivity locations in slug tests.
  - ➢Higher COC concentrations in groundwater monitoring.
- Can be flexible in making adjustments, if needed.

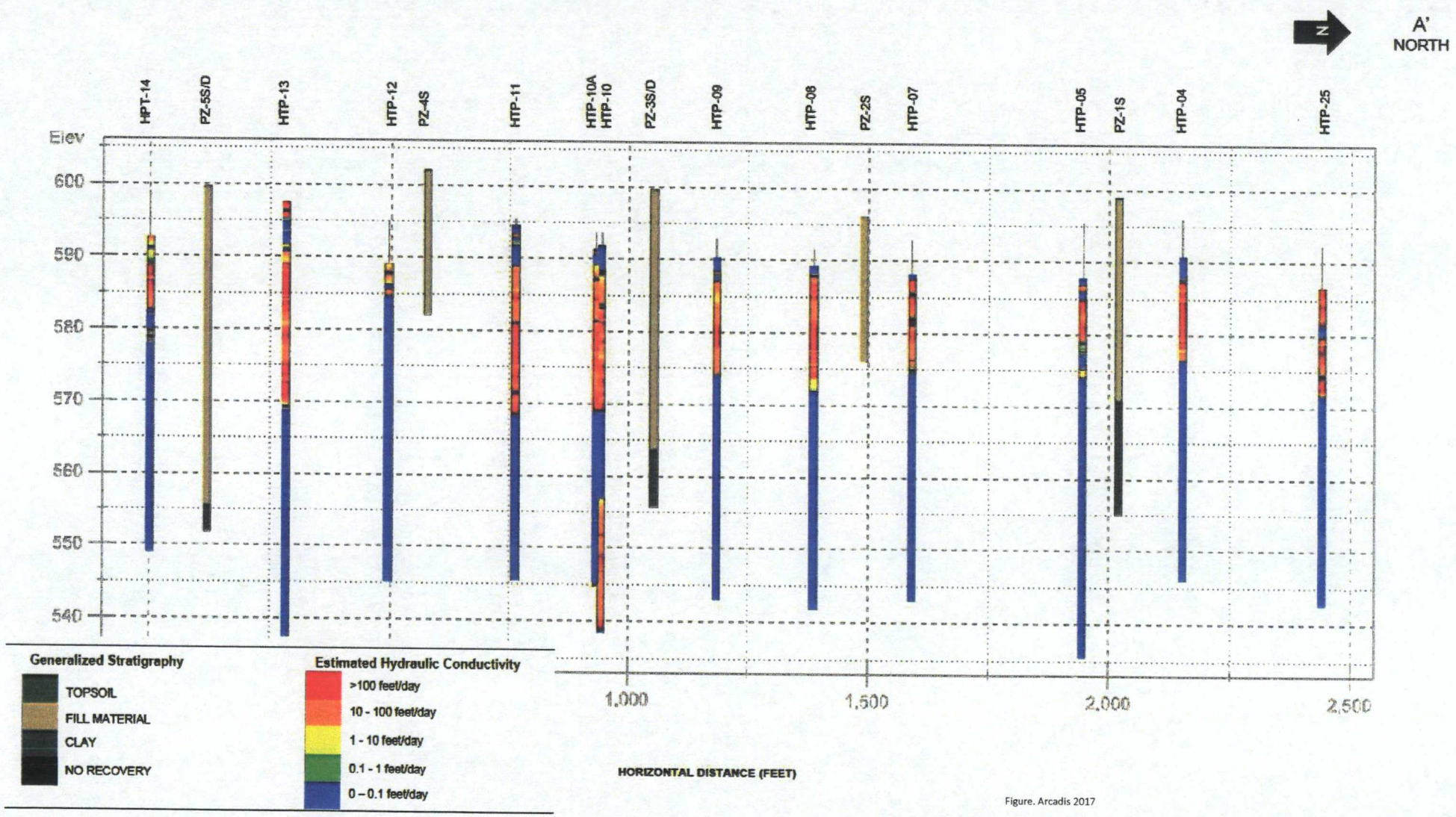
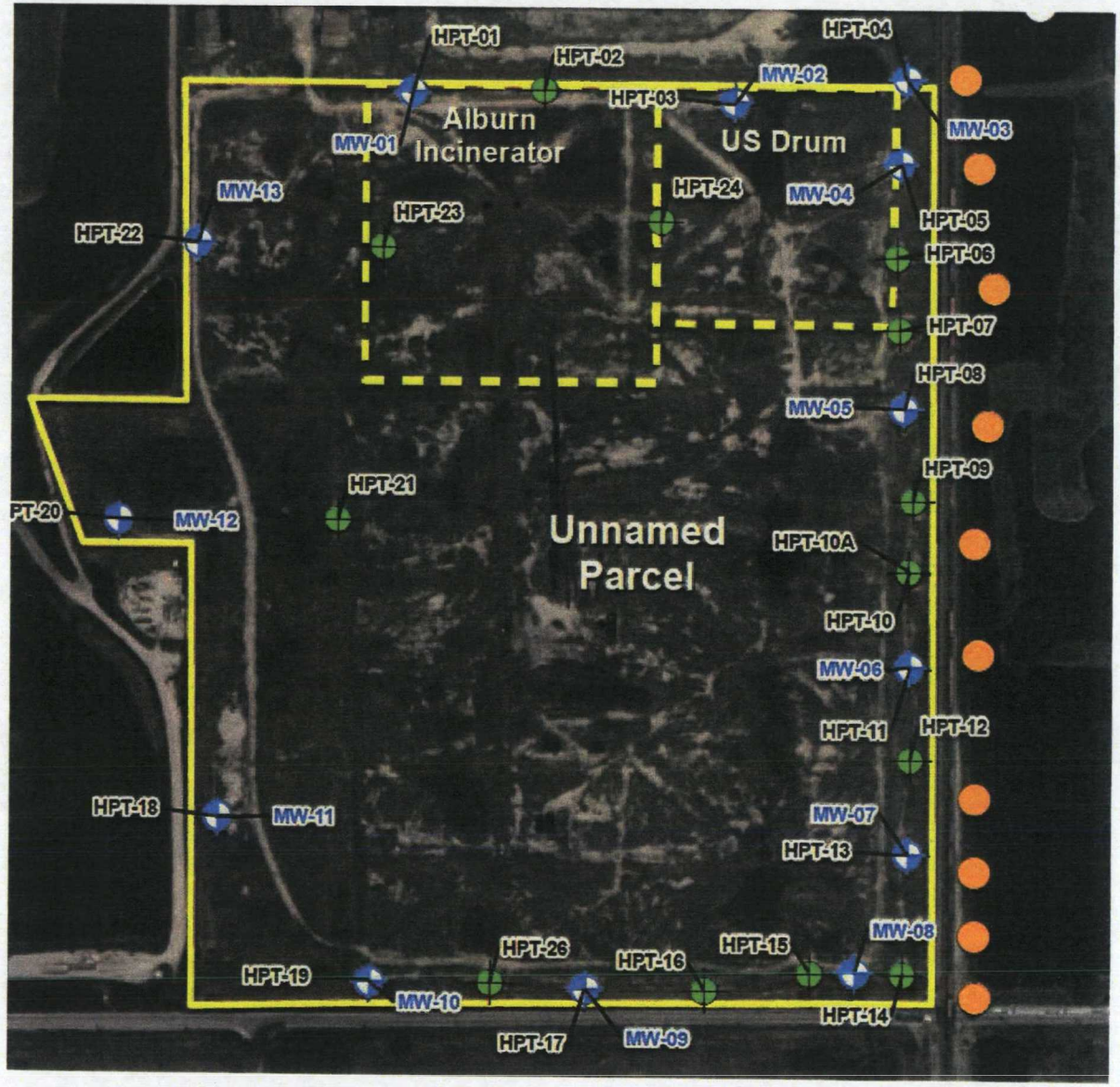


Figure. Arcadis 2017

LEGEND

- Monitoring Well Location
- Near Site Proposed Surface Water Samples
- HPT/VAP Location
- Alburn Incinerator / US Drum
- Lake Calumet Cluster Site Boundary



Conclusions

- Proposed study will characterize impacts of groundwater emanating from LCCS on the quality of surface water in Indian Ridge Marsh.
- Results will directly inform the baseline human health and ecological risk assessments.
- This approach and scope satisfies the requirements of the SOW and recognizes the realities of the location and historical industrial impacts surrounding LCCS and within Indian Ridge Marsh.